VTN-0549

CONTACT LENS PACKAGE

Field of the Invention

The present invention relates to contact lens packages, and in particular to disposable contact lens packages commonly referred to as blister packages.

Background of the Invention

Soft hydrogel contact lenses have been increasing in popularity ever since they were first introduced in the 1970's. Such contact lenses are conventionally packaged in the hydrated state and in a storage solution. Currently, many contact lenses are packaged, along with the aqueous storage solution, in a disposable plastic blister package. Examples of blister packages can be seen in U.S. Pat. Nos. 4,691,820; 5,524,419; 5,578,331, 5,649,410 and 5,722,536, the entire disclosures of which are incorporated herein by reference. The base of a blister package can either be part of the original contact lens mold or a separately molded base. Examples of packages using the mold as part of the package can be seen in U.S. Pat. Nos. 5,036,971; 5,143,660; 5,407,062 and 5,573,108, the entire disclosures of which are incorporated herein by reference. In all of the above mentioned package types, the base that contains the contact lens and any aqueous storage solution, whether it is a separated molded base or part of the original contact lens mold, is sealed by a flexible lidstock. This lidstock is typically a laminated foil which can be pulled back by a user to access the lens contained in the base. Typically, this lidstock is sealed to the area surrounding the portion of the base containing the contact lens. This sealing area of the base has typically been a flat surface area, or a raised flattened annular surface as seen, for example, in U.S. Pat. No. 5,722,536. However, it has been found that this flat surface, whether raised or not, can pose problems during the sealing process. If a molding process is used to form the blister package, for example, the material may have some shrinkage, resulting in somewhat concave sealing surface. Any low spots or unevenness of the sealing surface can additionally cause microbubbles and result in a poor seal. Storage solution used to keep the contact lens hydrated can inadvertently spill and then remain on the sealing area; this can lead to a poor seal between the lidstock and the package base.

US Patent 6,082,533 attempted to address the just-described problem by providing a heat-sealing area consisting of a raised annular area having an arcuate surface on the top

of the raised area. That invention only partially addresses the problem of storage solution splashing onto the heat-seal area of the package. For the design shown in Fig 3 of that patent, the wall 220 that defines one side of the raised heat-seal area meets the surface of the flange at a 90 angle. This may cause problems when a lidstock is heat-sealed to the package after storage solution has been spilled on the package, because when the plastic begins to flow during heat-seal it can trap the solution between the wall 220 and the flowing plastic. The solution may become super heated and may blow holes in the plastic of the heat-seal or in the sealed joint between the melting plastic and the flexible lidstock.

Accordingly, it is an object of the present invention to provide a package for contact lenses that includes an improved sealing area on the base of contact lens package.

SUMMARY OF THE INVENTION

This invention provides an improved contact lens package that comprises a base and a recessed well within the base for containing a contact lens, wherein the base comprises a raised seal volume comprising two linear sides that meet the upper surface of a horizontal plane at an angle from 125 to 165 degrees. A lidstock is removably sealed to the base at this raised seal volume. This package is preferably a disposable package.

This invention provides the benefit that when the plastic within the raised seal volume begins to flow during the sealing process, then the linear sides of the raised seal volume will provide a means for removing, or pushing away any solution that was splashed onto the top surface of the package including the raised seal volume. Further, this invention prevents that solution from getting trapped within, or under the flowing plastic of the seal volume when a lidstock is heat sealed to the base at the seal volume, which as described above causes the solution to superheat and explode channels within the heat seal plastic and/or within the interface bonding joint between the heat seal plastic and the flexible lidstock.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a top perspective view of a contact lens package of this invention shown prior to heat-sealing lidstock onto the package;

FIG. 2 is an enlarged cross-sectional view of the sealing area of the package of

FIG. 1, with an exploded view of the seal volume, taken along the line 2-2 shown in FIG. 1;

FIG. 3 is a top perspective view of an alternative embodiment of a contact lens package of this invention shown prior to heat-sealing lidstock onto the package; and

FIG. 4 shows an enlarged cross-sectional view of the sealing area of the package of FIG. 3, with an exploded view of the seal volume, taken along the line 4-4 shown in FIG. 3.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a disposable plastic blister package used for packaging a contact lens. More specifically, as seen in FIG. 1, package 10 generally comprises support base 12 with recessed well area 14 for receiving and holding a contact lens (not shown). Generally, the contact lens will be packaged along with an aqueous storage fluid, such as buffered saline solution, in well area 14. Package 10 may be molded from a material such as polypropylene, polystyrene, or similar plastic. Base 12 includes a flange 15 having a top surface 16. The flange 15 is present all around, that is surrounding, the well area 14. As shown, the flange further comprises a raised seal volume 20 encircling the perimeter 28, that is, following the contour, of well 14 in the top surface 16. In use, a contact lens is deposited in well 14 with a quantity of aqueous storage fluid, lidstock is applied, so as to cover at least the raised seal volume 20 or substantially the entire top surface 16, typically by heat-sealing the lidstock to the raised seal volume 20, thereby hermetically sealing the contact lens in well 14 of package 10. The shape of the package 10, the base 12, the well 14, and the raised seal volume 20 can vary as long as the elements of the raised seal volume claimed below are present in the package 20.

FIG. 2 shows an enlarged cross-section of a portion of the package 10 of FIG. 1 along the line 2-2, shown in FIG 1. The raised seal volume 20 is shown comprising two linear sides, a first linear side 21, and a second linear side 22, which meet at a point or rounded point 23 which is the uppermost surface of the raised seal volume 20. The first linear side 21 is located closer to the well 14. The second linear side 22 is located further from the well 14. The first linear side 21 meets the well 14 at corner 27 which defines the perimeter 28. The corner may be rounded or sharp as desired. Angle alpha shown at the base of linear side 21 is defined by the intersection of linear side 21 with the horizontal

plane P as shown. Typically horizontal plane P is parallel to the opening of the well when the package is resting on a flat surface. Most packages provide supports 29 or other structures for this purpose. Angle alpha is preferably from 125 to 170 degrees, more preferably from 135 to 165 degrees, and most preferably from 145 to 165 degrees, and even more preferably from 155 to 165 degrees. The second linear side 22 meets the top surface of the flange 16 at angle beta. However, if the flange 16 is not in the horizontal plane then angle beta is defined as the angle formed at the intersection of linear side 22 and the horizontal plane P. Angle beta is preferably from 125 to 170 degrees, more preferably from 135 to 165 degrees, and most preferably from 145 to 165 degrees, and even more preferably from 155 to 165. Preferably, the linear sides have respective lengths D, E from 0.10mm to 0.65mm, more preferably from 0.14mm to 0.45mm, and most preferably from 0.18mm to 0.25mm. The preferred overall width A of the raised seal volume 20 is from 1.16mm to 2.30mm, more preferably from 1.22mm to 1.85mm, and most preferably from 1.34mm to 1.56mm. The preferred overall height B of the raised seal volume 20 is from 0.1mm to 0.3mm, more preferably from 0.12mm to 0.24mm, and most preferably from 0.14mm to 0.16mm.

It is preferred that linear sides 21 and 22 and angles alpha and beta are mirror images of each other; however that is not required as long as both linear sides are present as parts of the raised seal volume 20, and as long as the angles are both within the ranges specified. Lengths D and E and angles alpha and beta can vary and be different from one another, depending on location of raised seal volume 20 in relation to other features and considerations within the package.

As shown, in the preferred embodiments, the flange extends away from the well past the seal volume as shown, but in alternative embodiments, the outside edge of the flange may not extend beyond the seal volume.

FIG. 3 and 4 show an alternative embodiment of the package of this invention. FIG. 3 is a perspective plan view of the package and FIG. 4 shows an enlarged cross-section of a portion of the package 10 of FIG. 3 along the line 4-4. FIG. 3 and 4 show a package having a raised seal volume 20 that is located a distance C between the perimeter 28 of the well 14 and the surface of the raised seal volume 20 closest to the well 14. Note that C may vary in a package design, because it is not required that the raised seal volume follow the perimeter of the well exactly or even at all. Preferably C is from 0 and 6 mm,

more preferably from 1 to 5 mm and most preferably from 2 to 5 mm. Additionally, the raised seal volume 20 as shown in FIG. 3 and 4 has a rounded top surface 43 contiguous with and located between the linear sides 21 and 22. The radius of the rounded surface 43 is preferably from 1.0mm to 10.0mm, more preferably from 1.5mm to 6.0mm , and most preferably from 2.0mm to 5.0mm. Further the width F of the rounded surface 43 is preferably from 0.50mm to 2.0mm, more preferably from 0.50mm to 1.5mm, and most preferably from 0.50mm to 1.0mm. The other features of this embodiment are as described for the earlier embodiment, namely, the angles, lengths of the linear sides, the width of the heat seal, and the height of the seal volume.

FIG 3 and 4 shows the preferred embodiment, because the distance C provides a space in which the melted plastic of the raised seal volume may flow and not create a rough surface that would be adjacent to, extend above, or flow into the well that may damage a contact lens as it is removed from the recessed well. However it may be possible in accordance with this invention, if the correct sealing conditions and materials are used, to locate the raised seal volume adjacent to the well by providing a large length D of side 21.

Many other modifications and variations of the present invention are possible to one skilled in the field in the field in light of the teachings herein. It is therefore understood that, within the scope of the claims, the present invention can be practiced other than as herein specifically described.